

Slow light, modal dispersion and mini stop bands in photonic crystal waveguides: experiment and modelling

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We have probed the modal dispersion of planar photonic crystal (PhC) waveguides fabricated on SOI. Experimentally, we have imaged the light above the surface of the waveguides using a pulsed laser source with a phase sensitive Near-field Scanning Optical Microscopy (NSOM). This has allowed us to show the real space observation of fast and slow pulses propagating inside a W3 PhC waveguide. Local phase and group velocities of modes are measured. For a specific optical frequency we observe a localized pattern associated with a flat band in the dispersion diagram. Movement of the field is hardly discernable in a 3ps time window: its group velocity would be at most $c/1000$ [1]. The huge trapping times without the use of a cavity should open new perspectives for dispersion and time control within PhCs.



Pulsed laser excites modes of a PhC waveguide. The time elapsed between these two frames is 2.8ps

[1] H. Gersen, et al, *Phys. Rev. Lett.*, accepted for publication.